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Collembola from the Alpine Region of Mt. Poroshiri in the Hidaka Mountains, Hokkaido

By

Riozo YOSHII*

吉井良三*：日高山脈高山帯のトビムシ類

Participated in the research party of the National Science Museum, Tokyo, I have had a chance to investigate the collembolan fauna of Mt. Poroshiri (2,052 m alt.) of the Hidaka Mountains in Hokkaido during the period from 24 July to 30 July in 1971. In the present article, only those species are dealt with, which were collected in the alpine region of the mountain where pikas were piping and wild bears were roaming. Materials were collected by myself and by Dr. J. AOKI of the National Science Museum, to whom I must express my hearty thanks.

Family Hypogastruridae

1. *Hypogastrura (Ceratophysella) denisana* YOSHII, 1954

North Cirque, Mt. Poroshiri (25 exs., 25. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (3 exs., 26. VII. 1971).

The species is concordant with the lowland examples of Honshu. From *H. glancei* HAMMER, 1953, it is different in the presence of two thick setae of dens. Its distribution is, so far as known, restricted to Japan, but the species may be expected from the boreal region of the Holarctis.

2. *Hypogastrura (Ceratophysella) ainu* sp. n.

(Fig. 1)

North Cirque, Mt. Poroshiri (35 exs., 25. VII. 1971).

Body length 1.3 mm. Colour castaneous brown, either intensely dark or a little paler and mottled all over. Extremities are also pigmented in the same colour. Ant. IV bearing trilobed apical bulb and some 3 blunt sensory setae. Ventrally the segment has no tuft of peg-like setae. Ant. III/IV with an eversible sac. Ant. III-organ is of two short rods with a groove, each side of which is guarded by a conspicuous blunt sensory seta. Labral setae as 4/5, 5, 4; labral margin with an irregular, obscure transverse fold or ridge. Postantennal

* Biological Laboratory, Yoshida College, Kyoto University, Kyoto
京都大学 教養部 生物学教室

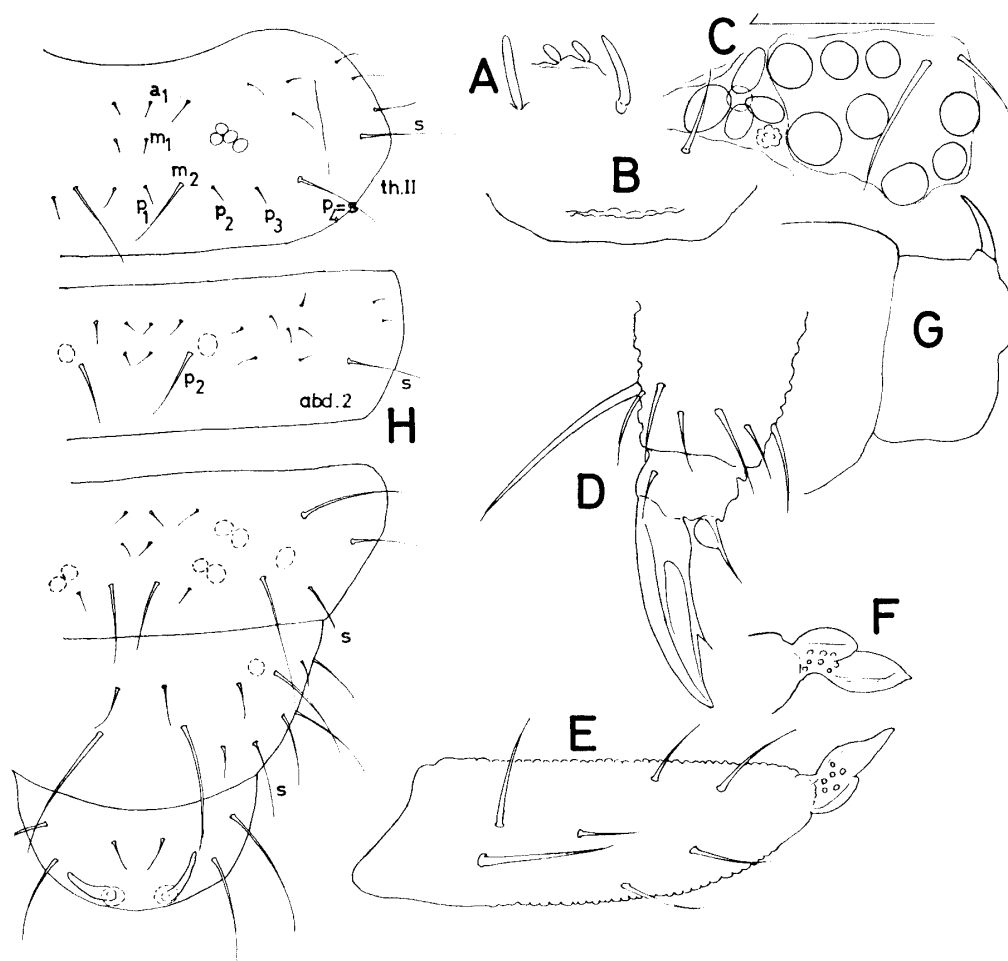


Fig. 1. *Hypogastrura (Ceratophysella) ainu* sp. n. — A: ant. III-organ, B: labral margin, C: eyes and postantennal organ, D: hind-leg, E: dens and mucro (dorsal), F: mucro, G: abd. VI with anal spine, H: chaetal arrangement.

organ fairly large and adjacent to the eye-field. Four elements are subequal and an accessory tubercle is remote from them. Of $8+8$ black eyes A and B are seemingly larger than the others. Unguis broad, with one inner tooth but without lateral teeth. Unguiculus rather short, with conspicuously broad inner basal lamella and its axial seta is twice the length of it. Tenent hair 1, 1, 1, pointed at apex. Ventral tube with 4×4 setae. Rami tenaculi quadridentate. Furca well developed, d:mu as 10:35. Dens not tapering, dorsally granular equally all over and with 7 setae including a basal large one. Mucro rather short, acuminate apically and with a distinct but narrow outer lobe. Inner side broadly inflated and hyaline, extending to the almost pointed apical lobe. Basal part of mucro is feebly granular. Anal spines are slender, curving and on papillae which are separated from each other at the basis. They are placed near the distal end of the segment. Chaetal arrangement is typical for the *denisana*-group. On the head all setae are typically arranged and none of them are spiny. Th. I with $3+3$ setae. On th. II, III the large *m*-2 is dislocated posteriorly to the *p*-row

between $p-1$ and $p-2$ in equal distance. On abd. I-III m -seta is missing, $p-2$ very large. On abd. IV seta $p-1$ and $p-3$ are very large, while $p-2$ is very short. On abd. V seta $p-1$ is large and anteriorly dislocated. $a = 20-23$, $b = 13-15$. All the body setae are smooth and slender; $s.s.$ are not well differentiated and scarcely discernible from small body setae. Integument minutely and equally granular all over.

Typus: One female from the North Cirque of Mt. Poroshiri.

The species is, without doubt, a near relative of *H. glancei* HAMMER, 1953, of Canada, whose chaetotaxy is given in YOSII (1960, p. 263, fig. 6). However, the body colour is castaneous brown instead of purple black, mucro is in another form and anal spines are not especially anterior in position. Setae of abd. V are in another arrangement.

3. *Hypogastrura (Cyclograna) horrida* YOSII, 1960

North Cirque, Mt. Poroshiri (1 ex., 26. VII 1971).

Distribution. USA, Japan, Nepal.

4. *Hypogastrura* (s. str.) *aterrima* sp. n.

(Fig. 2)

Summit of Mt. Poroshiri (4 exs., 26. VII 1971).

Body length 1.3 mm, intensely bluish black all over the body; ant.: head as 6:5, ant. segm. ratio as 10:12:12:18. Ant. IV with a round subapical bulb and some 7 slender sensory setae. No ventral tuft of small setae. Ant. III-organ is of two rods inserted near the basis of inverse V-shaped thickening of the sensory groove, which is provided with a blunt sensory seta on each side. Labral setae 4/5, 5, 4; labral margin with 4 round tubercles. Eyes 8+8, intensely black. Postantennal organ obscure, smaller than an eye in diameter and composed of 4 round elements in a cross. Unguis normal, untoothed. Unguiculus two-thirds of the unguis, with broad inner lamella which is one half the length of axial seta. Tenent hair 1, 1, 1, distinctly clubbed at apex. Ventral tube with 4+4 setae. Rami tenaculi tridentate in all the examples examined. Furca in ratio 15:15:5. Dens finely and uniformly granulate dorsally, with 7 subequal setae. Mucro boat-shaped, obtuse apically and with very narrow inner and outer lamella. Anal spine reduced, only a little larger than the integumental granule and without basal papilla. Body setae are small, $s.s.$ being longer. Th. I with 3+3 setae, th. II and III with $s.s.$ at the place of $p-4$ and abd. I-III with $s.s.$ at the place of $p-5$. On abd. IV the chaetal arrangement is rather peculiar, $s.s.$ being at the position of $p-4$. Abd. V bearing two rows of setae, $s.s.$ at the position of $p-3$, and 2+2 setae are present between foveae.

Typus: One ex. from the summit of Mt. Poroshiri.

The species is a near relative of *H. sahlbergi* (REUTER, 1895) of Eupore, but according to GISIN (1960), the latter species has many setae on the ventral tube and 4 teeth on rami tenaculi. The present species may have some relationship to *H. himalayensis* YOSII, 1971, although postantennal organ is quite different.

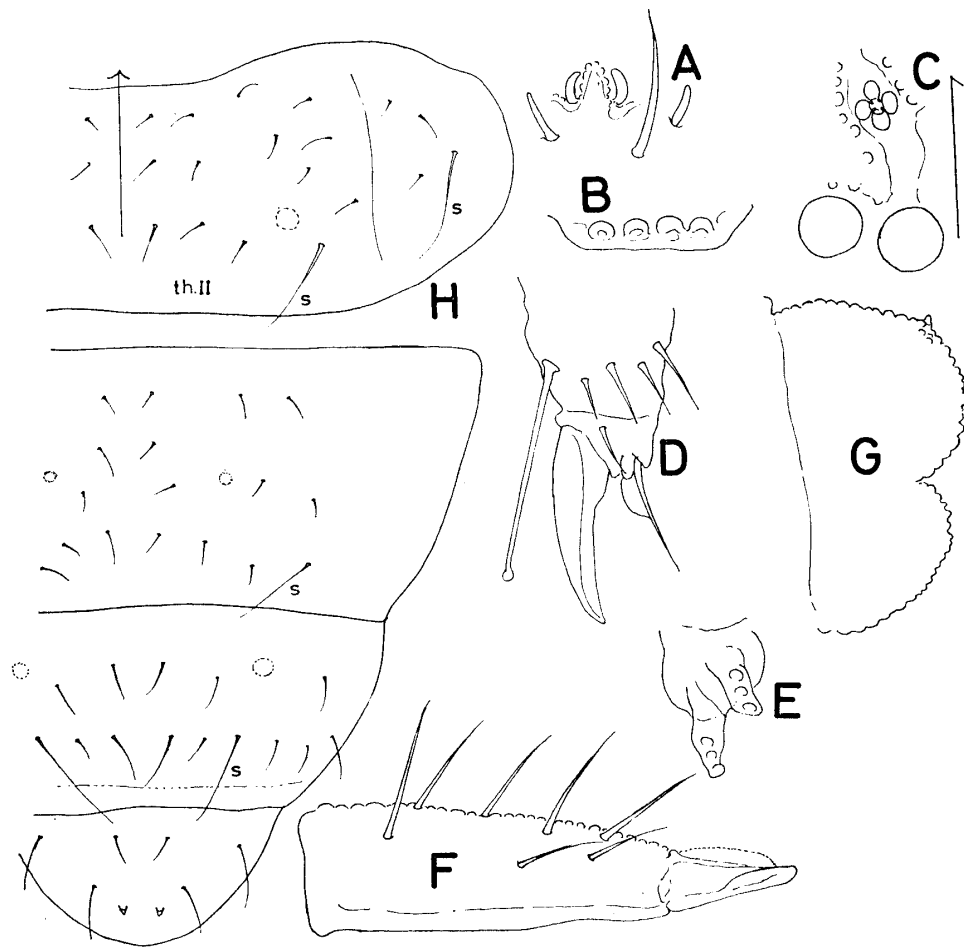


Fig. 2. *Hypogastrura* (s. str.) *aterrima* sp. n. — A: ant. III-organ, B: labral margin, C: postantennal organ, D: hind-leg, E: tenaculum, F: dens and mucro, G: abd. VI with anal spine.

5. *Hypogastrura* (s. str.) *theeli* (TULLBERG, 1876)

(Fig. 3)

Nanatsunuma Cirque, Mt. Tottabetsu (5 exs., 27. VII. 1971); North Cirque, Mt. Poroshiri (2 exs., 26 VII. 1971).

Body length up to 1.6 mm. Colour dirty gray, mottled; ant.: head as 65:60, ant. segm. ratio as 13:13:18:20. Ant. IV with a round apical bulb and 7 slender sensory setae, ventral side with a tuft of peg-like setae. Ant. III-organ is of two blunt rods with a groove, guarded by a blunt seta on each side of it. Labral setae 4/5, 5, 4, without any structure on distal margin. Eyes 8+8, intensely black. Postantennal organ smaller than an eye, consisting of 4 small elements in a rosette and with an accessory tubercle. Unguis rather slender, with one small inner tooth and 1–2 minute lateral teeth, the latter being almost a plication of the lateral margin of carina. Unguiculus with broad inner margin, its apex attaining half the unguis. No clavate tenent hair. Ventral tube with 4+4 setae. Rami tenaculi quadridentate. Furca in ratio as 35:22:10. Dens equally granular dorsally and with 7 slender setae, a prox-

imal seta being long. Mucro converging and curving; it ends in a blunt apex. No lamella present, but a narrow marginal ridge may be seen along the inner side which is abruptly ending near apex. Anal spines short and straight, acute apically and on low papillae, which are remote from each other. Body setae are all subequally large, lightly serrate unilaterally on distal half in posterior abdominal segments. Their arrangement is typical for *Hypogastrura* (s. str.). On the head no setae are modified, *area verticalis* with 2+2 setae. Th. I with 3+3 setae. On th. II and III s.s. being at the position of *p-4* and *m-2* is situated just at the nominal place. On abd. I-IV s.s. is at the position of *p-5*. Abd. V is uniformly

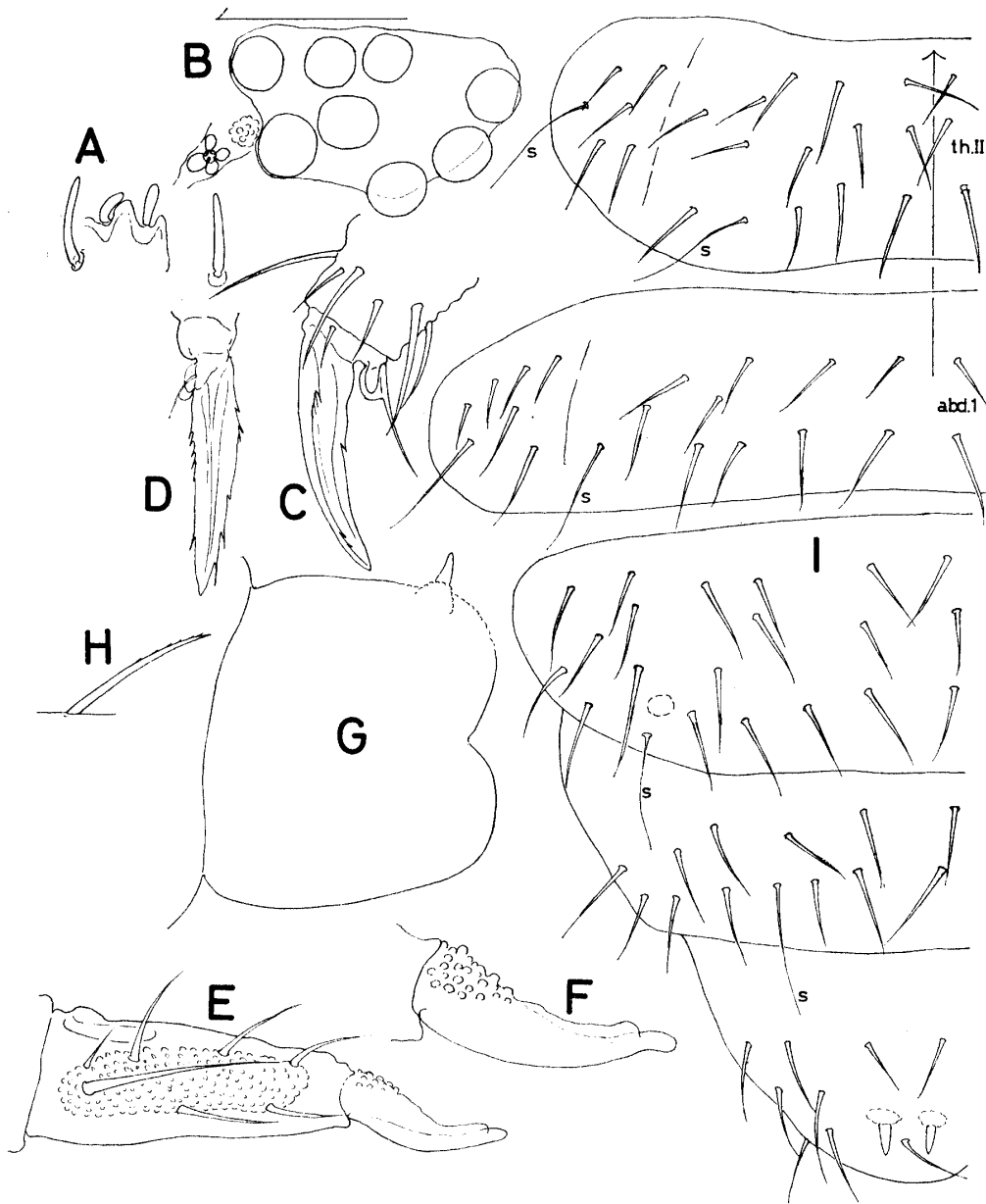


Fig. 3. *Hypogastrura* (s. str.) *theeli* (TULLBERG) from Mt. Poroshiri. — A: ant. III-organ, B: eyes and postantennal organ, C, D: mid-leg, E: dens and mucro, F: mucro, G: abd. VI with anal spine, H: seta on abd. VI, I: chaetal arrangement,

granular and s.s. is at the position of $p-3$; $a=18$, $b=6$; $2+2$ setae are present between foveae.

The identity of this species is somewhat puzzling. The original description of *A. theeli* TULLBERG, 1876, is a short notice of no importance. Another species, *Achorutes trybomi* SCHÖTT, 1893, was described from the arctic island of Siberia, but afterwards SCHÖTT (1902) synonymized it with *A. theeli*. Independently, HAMMER (1953) identified Canadian species with *H. trybomi* and described it in full detail. Our examples coincide well with her description, so that the Hokkaido examples are identified with *H. theeli* provided that HAMMER's *H. trybomi* is rightly identified.

Family Neanuridae

6. *Friesea japonica* YOSII, 1954

North Cirque, Mt. Poroshiri (1 ex., 26. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (2 exs., 27. VII. 1971).

Chaetal arrangement of the present species illustrated in YOSII (1956) is, as already cited by GAMA (1964), partly not exact. In the present material it is identical with the pattern shown by *Friesea ladeiroi* GAMA (1964, p. 99, fig. 18), and on abd. V the seta $a-2$ is always missing. The ventral tube bears $3+3$ minute setae. The species may correspond with *F. truncata* CASSAGNAU, 1958 (*F. mirabilis* f. *reducta* STACH, 1949) of Europe.

Distribution. Endemic to Japan.

7. *Micranurida pygmaea* BÖRNER, 1901

Nanatsunuma Cirque, Mt. Tottabetsu (1 ex., 27. VII. 1971).

Distribution. Holarctic.

8. *Micranurida papillosoides* HAMMER, 1953

North Cirque, Mt. Poroshiri (1 ex., 25. VII. 1971).

One example at hand coincides well with HAMMER's description, but the body colour is totally white.

Distribution. Arctic Canada, Japan (nov.).

9. *Paranura sexpunctata* (AXELSON, 1902)

Summit of Mt. Poroshiri (1 ex., 27. VII. 1971); North Cirque, Mt. Poroshiri (1 ex., 25. VII. 1971).

In these examples chaetal arrangement is quite the same as that I have reported before (YOSII, 1969), but the large body setae on the posterior half of body are distinctly clavate. Male genital orifice is rounded and with about 10 small setae. Length 1.3 mm, bluish gray and mottled.

Distribution. Northern Europe, Japan.

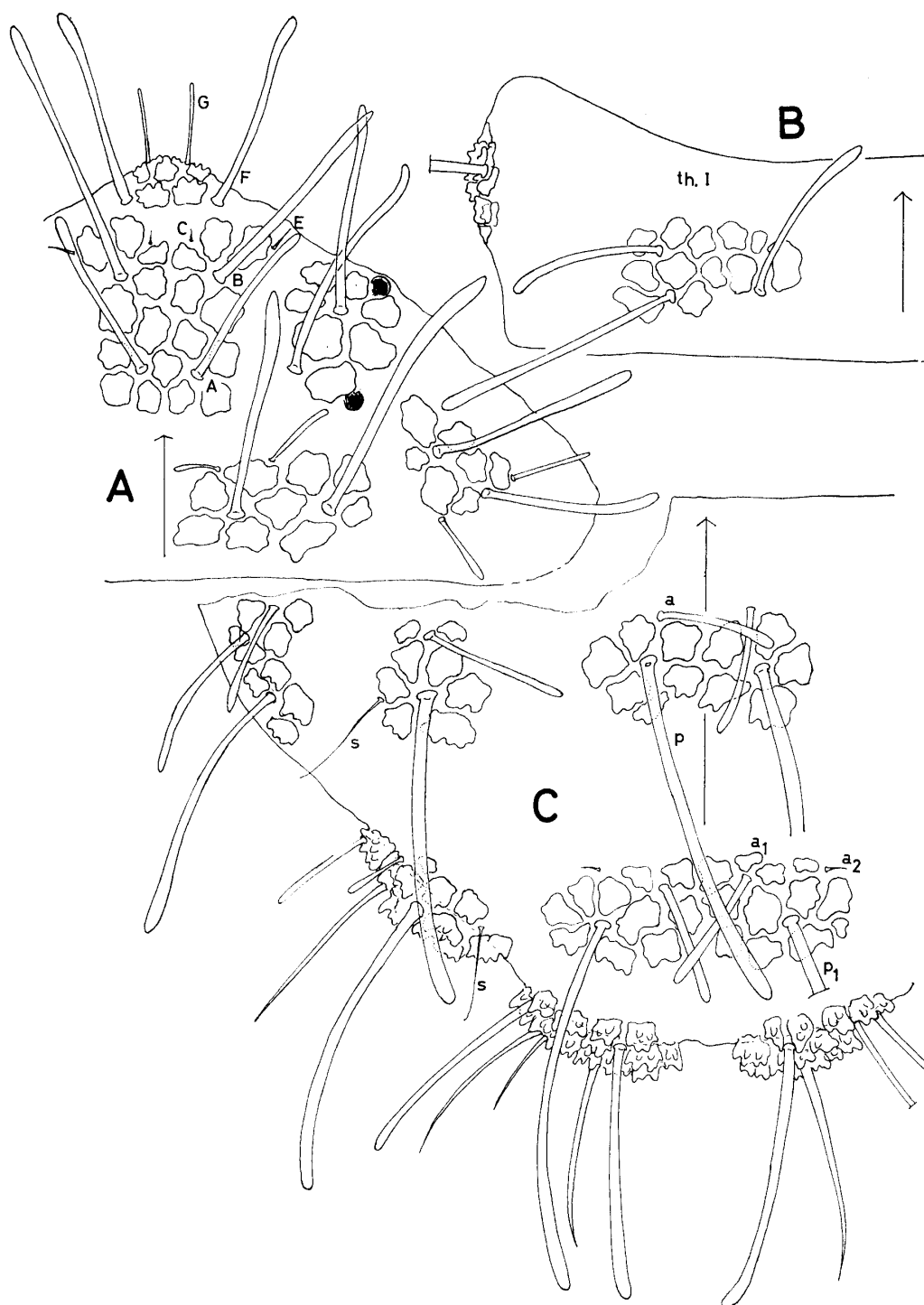


Fig. 4. *Neanura ezomontana* sp. n. — A: head, B: th. I, C: abd. IV-VI.

10. **Morulina gigantea** (TULLBERG, 1876)

North Cirque, Mt. Poroshiri (12 exs., 25. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (3 exs., 26. VII. 1971).

Distribution. East Siberia, Japan, Alaska, USA.

11. **Neanura abietis** YOSII, 1969

Nanatsunuma Cirque, Mt. Tottabetsu (1 ex., 26. VII. 1971); Asahikawa (3 exs., 24. V. 1954, G. IMADATÉ).

Distribution. Endemic to Japan.

12. **Neanura ezomontana** sp. n.

(Fig. 4)

Summit of Mt. Poroshiri (3 exs., 27. VII. 1971).

Body length 1.7 mm, colour almost pale. Antennae short, with usual arrangement of blunt sensory setae and the third antennal organ. Buccal cone short and cuspidate. Eyes 2+2, poorly pigmented. Unguis untoothed and smooth on its inner side. Ventral tube with 4+4 setae. Furcal rest obscure, represented by some 5 small setae. Chaetal arrangement as follows:

head:	4,	4,	4+ii	
th. I:	3,	1.		
th. II:	3,	s+2,	3+s,	3.
th. III:	3,	s+3,	3+s,	3'.
abd. I-III:	2,	3+s,	2,	2-4.
abd. IV:	(2+2),	2+s,	3,	7.
abd. V:	(2+i, 2+i),	s+7.		
abd. VI:	7.			

On the head all tubercles are separated; A and B of the central tubercles are well developed, while C and E are minute and D is quite absent. O-seta of the central tubercle is not represented. The dorsal and subdorsal tubercles of th. I are characteristically coalescent, having 3 setae on it. Tubercles of the succeeding segments are normally built, but the dorsal tubercles of abd. IV are fused in one mass and provided with 2+2 setae on it. Those of abd. V are also fused, *a*-1 and *p*-1 are large, while *a*-2 is minute. Paired tubercles of abd. VI are widely separated from each other.

Typus: One example from the summit of Mt. Poroshiri.

By the absence of *o*-seta of the head the species is near *N. piceae* YOSII, 1969, of Japan, but is quite different from it in the fusion of the dorsal and subdorsal tubercles of th. I as well as in the fusion of dorsal tubercles of abd. IV. The species seems to represent a characteristic element of the high alpine Collembola of Hokkaido.

Distribution. Endemic to Hokkaido.

Family Onychiuridae

13. *Lophognathella choreutes* BÖRNER, 1908

Summit of Mt. Poroshiri (5 exs., 26. VII. 1971); North Cirque, Mt. Poroshiri (1 ex., 25. VII. 1971).

Distribution. Japan (new to Hokkaido), USA (Oregon).

14. *Onychiurus (Oligaphorura) tottabetsuensis* sp. n.

(Fig. 5)

Nanatsunuma Cirque, Mt. Tottabetsu (4 exs., 27. VII. 1971).

Body length ca. 1.0 mm, general shape elongate and not broad posteriorly. Antennae short and clubbed on distal two segments. Ant. IV bearing an apical depression and some blunt sensory setae. Ant. III-organ composed of 4 guard setae, 5 short papillae, 2 sensory rods and 2 sensory bulbs, the latter being lightly granulate and the outer bulb much larger than the inner one. Labral setae as 4/3, 4, 2. Postantennal organ is alike to that in *O.*

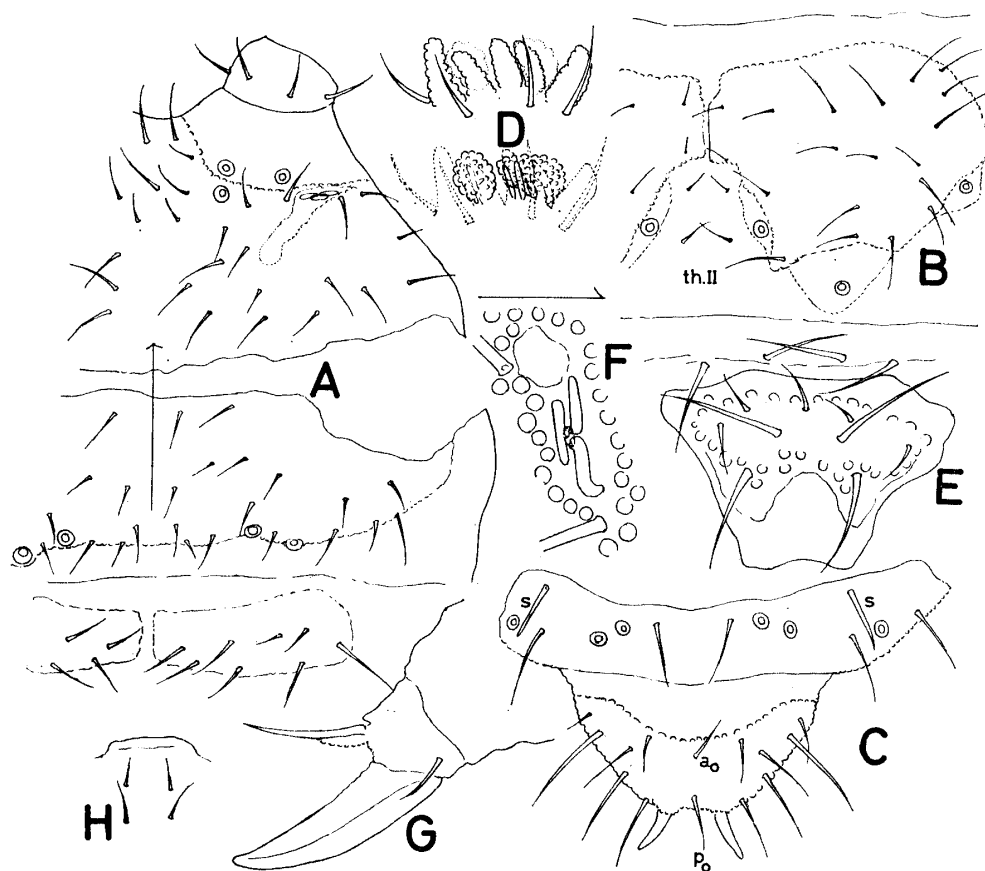


Fig. 5. *Onychiurus tottabetsuensis* sp. n. — A, B, C: chaetal arrangement of head, th. II and abd. V, VI, D: ant. III-organ, E: labrum, F: postantennal organ, G: hind-leg, H: furcal rest.

schoetti; it is composed of 3 elements, the anterior two of which are in a straight transverse row and the posterior one is directly attaching behind them. A large vesicular area is placed dorsal to the organ; however, this may be a swelling of the integument. Pseudocelli arranged as 2+1, 2/0, 3, 3/3, 3, 3, 3, 3 dorsally and 1+1/-ventrally. Coxae with 1, 1, 1 of them. Unguis untoothed, unguiculus well developed in all legs, their axial seta attaining two-thirds of the unguis and with broad basis, though not lamellate in structure. Ventral tube bearing 8+8 small setae. Furcal rest is a small transverse fold with 2+2 minute setae posterior to it. Anal spines are terminally situated, on low papillae, lightly curving upwards.

On the head antennal basis is well defined, *pso*-1 and *pso*-3 are placed in it, while *pso*-2 is in the granulate cephalic area. Two pseudocelli of the posterior part are at the margin of the granulate area and there are 2+2 setae between them. On th. I-III the tergal area is well defined; it is more distinctly granulated than the segmental margin and is furrowed along the median line. Three pseudocelli of th. II-III are at the border of this tergal area and encircled by the specially defined area of integument. On abd. I-V no such tergal area is found, the integument being uniformly crenulate all over. On abd. V the median two of three pseudocelli are close together and *s*-seta is slightly thicker than usual setae. On abd. VI the posterior half is well limited by the granulate structure; *a-o* always present.

Typus: One example from Nanatsunuma Cirque of Mt. Tottabetsu.

The species is very near *O. schoetti* (LIE-PETTERSEN, 1896, *sensu* STACH, 1947) of Europe with its peculiar postantennal organ, but differs by the absence of pseudocellus on th. I as well as by the presence of granulate area on th. I-III and on abd. IV. In this last-mentioned character it is near *O. quadrituberculatus* (BÖRNER, 1901), but is quite different in the form of the postantennal organ.

Distribution. Endemic to Hokkaido.

15. *Onychiurus (Protaphorurodes) tomuraushensis* (YOSII, 1940)

(Fig. 6)

Summit of Mt. Poroshiri (10 exs., 26. VII. 1971); North Cirque, Mt. Poroshiri (many exs., 25-26. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (6 exs., 27. VII. 1971).

Body length ca. 2.5 mm; white. General shape elongate and almost straight on each side of the body. Antennae straight, not clubbed, in ratio 3:3:4:8. Ant. III-organ composed of 5 setae, 5 low papillae, two short rods and two grossy granular bulbs. Labral setae as 4/2, 4, 2. Postantennal organ rather small, in a deep furrow and composed of 15-18 simple elements in a long rosette. Unguis large, with one inner and a pair of lateral teeth. Unguiculus very small, almost vestigial and with a faint axial seta not surpassing the lamellate portion. Dorsally on each tibiotarsus two long setae are present, the proximal one of which is lightly clubbed apically, the distal one is pointed but uprightly directed in form of a tenent hair. Some 2-3 long setae on the posterior side of each tibiotarsus are always curved inside and ending in a pointed apex. Ventral tube with some 12+12 setae. Furcal rest and abdominal organ of male perfectly absent. Anal spines rather short, blunt apically and on

papillae, which are touching to each other at the basis. Pseudocelli arranged dorsally as 3, 0/0, 1, 0 1/0-1, 0-1, 0-1, 2, 3. Ventrally as 0/- and 0, 0, 0 on coxal basis. Those on th. II to abd. III are either present or absent. Usually they appear on one side of an example. Three pseudocelli of abd. V are close together, situated on a low elevation of the

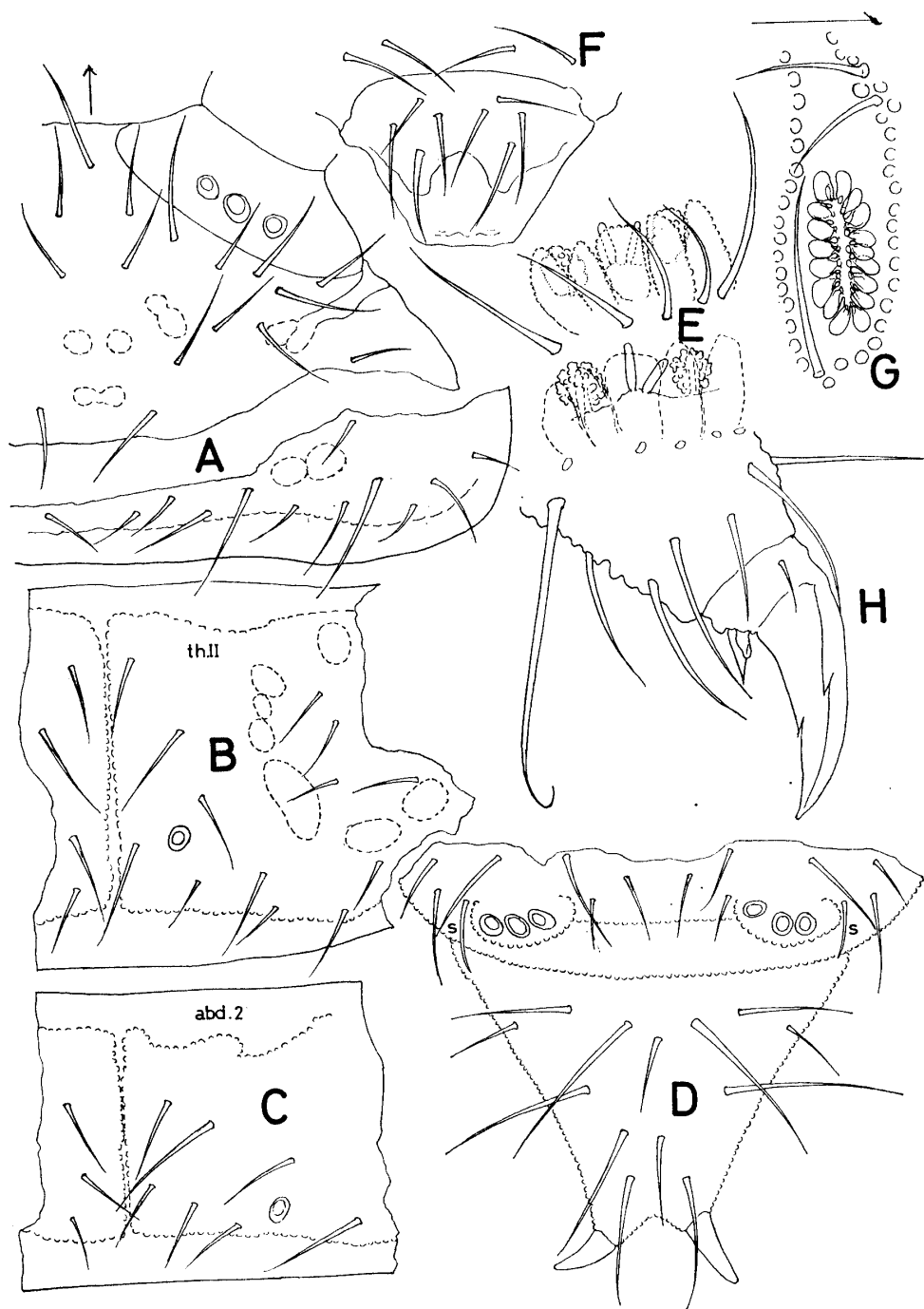


Fig. 6. *Onychiurus tomuraushensis* (YOSH) from Mt. Poroshiri. — A, B, C, D: chaetal arrangement of head, th. II, abd. II and abd. IV-VI, E: ant. III-organ, F: labrum, G: postantennal organ, H: hind-leg.

integument and accompanied by a small *s*-seta on the outer side. Integument distinctly granular; antennal basis and other segmental margins well defined. Granulate area has the median linear marking from th. I up to abd. III and all setae are almost symmetrically arranged with respect to the median marking. Abd. VI elongate in shape, granular throughout and with long setae, having both *a-o* and *p-o* though their occurrence is somewhat irregular.

The description above is based on Poroshiri examples, which coincide well with my previous materials from Mt. Tomuraushi, Mt. Daisetsu in Hokkaido. We have met with the species on the marshy place nourished by the melting water of perpetual snow which fills the couloir of the buttress of Mt. Poroshiri. Apparently the species is strictly cold stenothermal in habit. The species may be a near relative of *Onychiurus subtenuis* FOLSOM, 1917, of USA; they are concordant in the arrangement of pseudocelli and other details, but differ in the shape of unguiculus. For these two species the subgenus *Protaphorurodes* BAGNALL, 1949, may be applied.

Distribution. Endemic to Hokkaido.

16. ***Onychiurus (Protaphorura) longisensillatus nutak* ssp. n.**

(Fig. 7)

Summit of Mt. Poroshiri (2♂, 3♀, 27. VII. 1971); North Cirque, Mt. Poroshiri (3 exs., 25. VII. 1971).

Body length up to 2.0 mm; white. Outline of the body rather elongate. Ant. III-organ

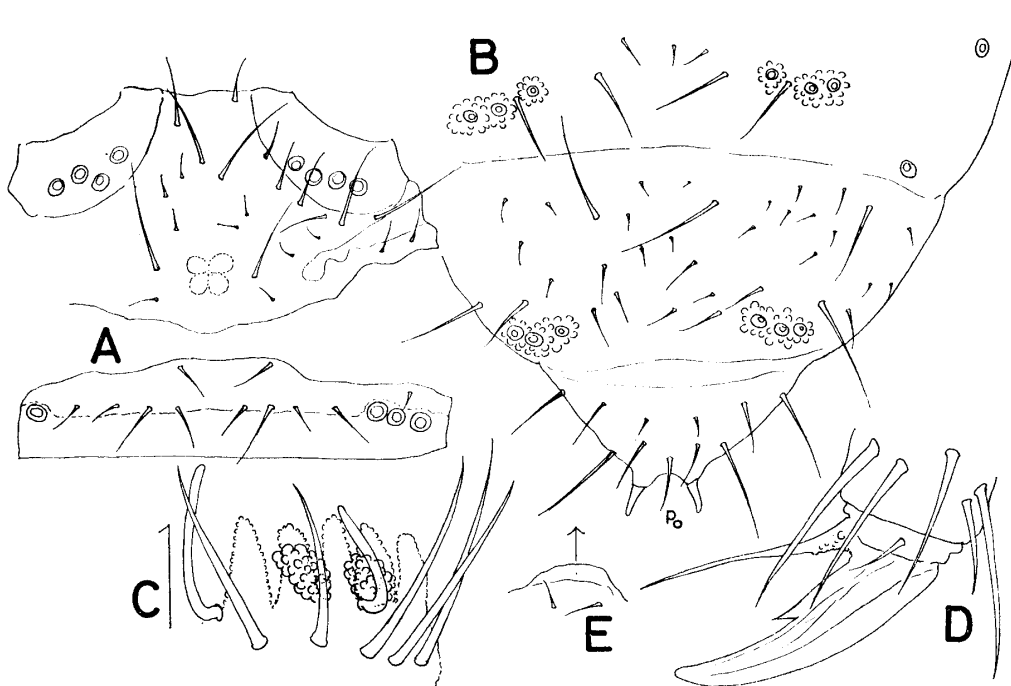


Fig. 7. *Onychiurus longisensillatus nutak* ssp. n. — A, B: chaetal arrangement of head and abd. IV–VI, C: ant. III-organ, D: mid-leg, E: furcal rest.

composed of 5 setae, 5 papillae and 2 granulate bulbs. Besides there are 2 slender sensory rods, one of which is inserted dorsal to the papillae and the other is situated between the third and the fourth ones. Postantennal organ, labral chaetotaxy and other characters of the head as in the nominate form and, therefore, there are 4 + 4 setae between the pseudocelli of the posterior margin. Unguis strongly carinate and with one strong inner tooth. Unguiculus setaceous, a little shorter than unguis and without basal lamella. Furcal rest is a small crescent thickening with 1 + 1 small setae. Anal spines moderately long, almost straight and on low papilla. Male abdominal organ absent. Pseudocelli as 4, 3/0, 2, 2/3, 3, 3, 3 + 2, 3. Antennal basis well limited and constantly with 4 pseudocelli. On abd. IV *pso*-1, 2 and 3 are near together in a common roughly granulated area, the others (*pso*-4 and 5) are laterally located. In other body segments their arrangement is as in the nominate form. Abd. VI bearing no *a-o* seta.

Typus: One male from the summit of Mt. Poroshiri.

The subspecies is quite concordant with *O. longisensillatus longisensillatus* YOSH, 1969, of Honshu, differing only in the additional number of pseudocelli on antennal basis and on the dorsal group of abd. IV. It may represent a high alpine race of the species in Hokkaido. The peculiar structure of ant. III-organ is quite remarkable. "Nutak" means "mountain" in Ainu language.

Distribution. Endemic to Hokkaido.

17. **Onychiurus (Protaphorura) octopunctatus** (TULLBERG, 1876)

(Fig. 8)

Summit of Mt. Poroshiri (2♂, 3♀, 27. VII. 1971).

Body length 2.0 mm; white. General shape elongate and subcylindrical. Antennae not clubbed. Ant. IV with a subapical pit and many slender sensory setae. Ant. III-organ composed of 5 setae, 5 papillae, 2 granulate bulbs and 2 short rods, the latter being in the normal position. Labral setae as 4/3, 4, 2; the first row of setae smaller than the others. Postantennal organ elongate, 40–45 elements being arranged in two rows, transverse to the axis of the organ. Unguis carinate, with one inner tooth, but without lateral teeth. Unguiculus setaceous, slightly shorter than unguis and without inner lamella. Ventral tube with 9 + 9 (3 basal, 6 distal) setae. Furcal rest is a small transverse thickening having 2 + 2 minute setae posterior to it. Anal spines short, one half the unguis in length, upright and on low anal papillae which are remote from each other. Antennal basis and other segmental margins distinctly limited. Pseudocelli arranged as 4, 3/0, 2, 2/3, 3, 3, 3 + 2, 4 dorsally, 1/- ventrally and 1, 1, 1 on coxal basis in typical examples. On head, 4 + 4 setae are placed between *pso*-1 of the posterior margin. The median marking of dorsal side reaching the middle of th. II. Pseudocelli of the dorsal group are in each granulated area. On abd. IV *p*-2 is lying between *pso*-1 and *pso*-2 and *s*-seta is anterior to the interval of *pso*-2 and *pso*-3. On abd. VI *a-o* is absent, the distance of *a*-1 is equal to that of *p*-1 on each side. Male has no ventral organ.

The discrepancy of various author's opinion with regards to this species has not yet

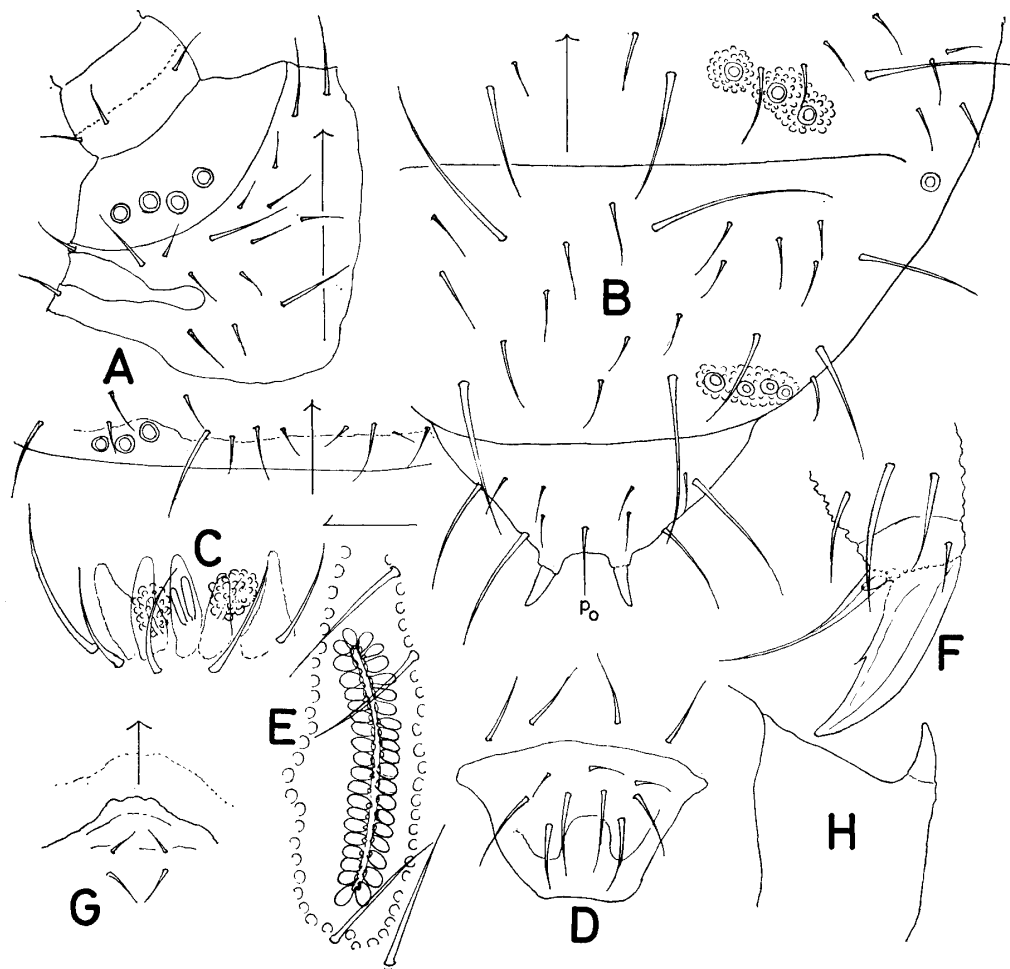


Fig. 8. *Onychiurus octopunctatus* (TULLBERG) from Mt. Poroshiri. — A, B: chaetal arrangement of the head and abd. IV-VI, C: ant. III-organ, D: labrum, E: postantennal organ, F: fore-leg, G: furcal rest, H: anal spine.

been settled. STACH (1954, p. 75) reviewed the history of the researches of this species and applied the name *O. octopunctatus* to a form distributed in Caucasus, western URSS and Styria. However, as the species was described from the arctic region of Siberia (Dukdinsoe, latitude 69°25'N) and later reported from Tschulkova, Tschukutsch Peninsula, etc., it would be one of the most frequent *Onychiurus* of the arctic region. Lately, the species was reported from the arctic circle of Canada (HAMMER, 1953, p. 38), and my examples from Mt. Poroshiri coincide well with the Canadian examples. Accordingly, the species determined by STACH as *O. octopunctatus*, which has distinct male ventral organ, must be regarded as an independent species, for which the name *O. ianstachi* sp. n. is given herewith.

A revision of the *armatus*-group of *Onychiurus*, to which the present species belongs, is already made by GISIN in his series of works, whose results are to be highly estimated. However, to establish various species by the difference of pseudocelli number alone seems

to be critically confirmed by succeeding researches.

O. armatus (TULLBERG, 1869): Arrangement of *a*-1 and *p*-1 on abd. VI are peculiarly trapezoid.

O. octopunctatus (TULLBERG, 1876): Furcal rest with 2+2 minute setae.

O. ianstachi sp. n.: With male abdominal ventral organ.

O. quadriocellatus GISIN, 1947: Abd. VI with *a-o* and *p-o*.

O. longisensillatus YOSHII, 1969: Ant. III-organ atypical for the genus.

18. *Onychiurus* (*Paronychiurus*) *japonicus* YOSHII, 1967

North Cirque, Mt. Poroshiri (3 exs., 25. VII. 1971).

The species is concordant with *O. conjungens* f. *exoensis* UCHIDA et TAMURA, 1968, from Sapporo.

Distribution. Endemic to Japan.

19. *Onychiurus* (*Kalaphorura*) *granulatus* (BÖRNER, 1909)

Summit of Mt. Poroshiri (4 exs., 26. VIII. 1971).

The species may be a near relative of *O. cocklei* FOLSOM, 1908, of USA. All examples are not full mature.

Distribution. Endemic to Japan.

Family Isotomidae

20. *Folsomia* *inoculata* STACH, 1947

Nanatsunuma Cirque, Mt. Tottabetsu (4 exs., 26. VII. 1971).

The species reported as *F. exoensis* YOSHII, 1965, from Mt. Daisetsu must be regarded as a synonym of this species.

Distribution. Europe, Japan.

21. *Folsomia* *quadrioculata* (TULLBERG, 1871)

Summit of Mt. Poroshiri (36 exs., 27. VII. 1971); North Cirque, Mt. Poroshiri (22 exs., 26. VII. 1971).

The examples coincide well with the diagnosis given in STACH (1947, p. 166). Ventral tube is anteriorly without setae, posteriorly with 4 setae. Lateral flap bears 3 setae each. Corpus tenaculi with 1 seta. Munubrial ventral setae 1+1, dental setae dorsally 3, ventrally as *v*, *v*, *v*, *ei*, *evi*,

Distribution. Holarctic.

22. *Folsomia octoculata* HANDSCHIN, 1925

Summit of Mt. Poroshiri (20 exs., 26. VII. 1971); North Cirque, Mt. Poroshiri (7 exs., 25. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (23 exs., 26. VII. 1971).

Distribution. Java, Nepal, Japan, etc.

23. *Cephalotoma ursi* sp. n.

(Fig. 9)

Summit of Mt. Poroshiri (3 exs., 27. VII. 1971).

Body length 2.6 mm; colour intensely bluish black and strongly mottled. General shape slender, head capsule almost quadrangular by the well developed mouth parts and alike to the head of ants. Antennae short, ant.: head as 13:12, ant. segm. ratio as 20:35:30:50. Ant. IV without subapical forked seta, but with an apical pit and a small knob. Ant. III-organ is of two curving rods in a groove, guarded by a small sensilla on each side of it. No sensory element is found on other antennal segments. Eyes 8+8, intensely black. Postantennal organ subelliptical, twice the eye in diameter, very thickly walled and situated at the basis of antenna far remote from the ocular patch. Mouth parts strongly modified. Labrum lowly trapezoid, with setae 4/5, 5, 4, the median 3 setae of the first row being much smaller than the others. Labral margin is, so far as observed in one example, very warty and verrucose. Mandible with degenerated molar plate and with a broad lobe dorsal to the shaft. Maxilla subapically with two bulbose lobes, the surface of which are minutely ciliate on their external sides. The shaft bearing 2 apical teeth and one small spinose process. Besides a hyaline lamella is attached to the dorsal side of the shaft. Labium with degenerated distal papillae, all of which are rather round in shape. Unguis carinate, with an inner tooth and a pair of well developed lateral teeth. Unguiculus slender, with one inner tooth. Tentorial hair absent. Ventral tube with ca. 6+6 setae anteriorly. Posterior face bearing 4 setae, the lateral ones of which are larger than the median setae. Rami tenaculi with 4 teeth, corpus long and with some 8 setae. Furca well extended, mand as 5:7. Of many dorsal setae of manubrium the distal 1+1 are placed in a special marked area. Ventrally the segment has fewer number of setae (ca. 18) along the longitudinal median area, and the lateral pair of the distal row is longer than the others. Terminal thickening rounded and obscurely cuspidate. Dens tapering, crenulate on distal half, dorsal setae as in Fig. 9-J, distal two pairs are always present. Ventral setae ca. 28 in number. Mucro quadridentate, apical tooth small, anteapical and the third subequal, the fourth lateral in position. A slight carina is attached to the anteapical tooth. Abdomen roundly ending, abd. V and VI confluent, with no sign of detectable margin. Body setae elongate and especially large on posterior abdominal segments. All of them smooth and never serrate.

Typus: One example from the summit of Mt. Poroshiri.

The species is named after an "Old Fellow", who threatened us during our camping in the mountain. It is very striking by the modified form of the maxilla, which reminds us of the licking mouth part of Muscidae, but in other respects the species is almost concordant

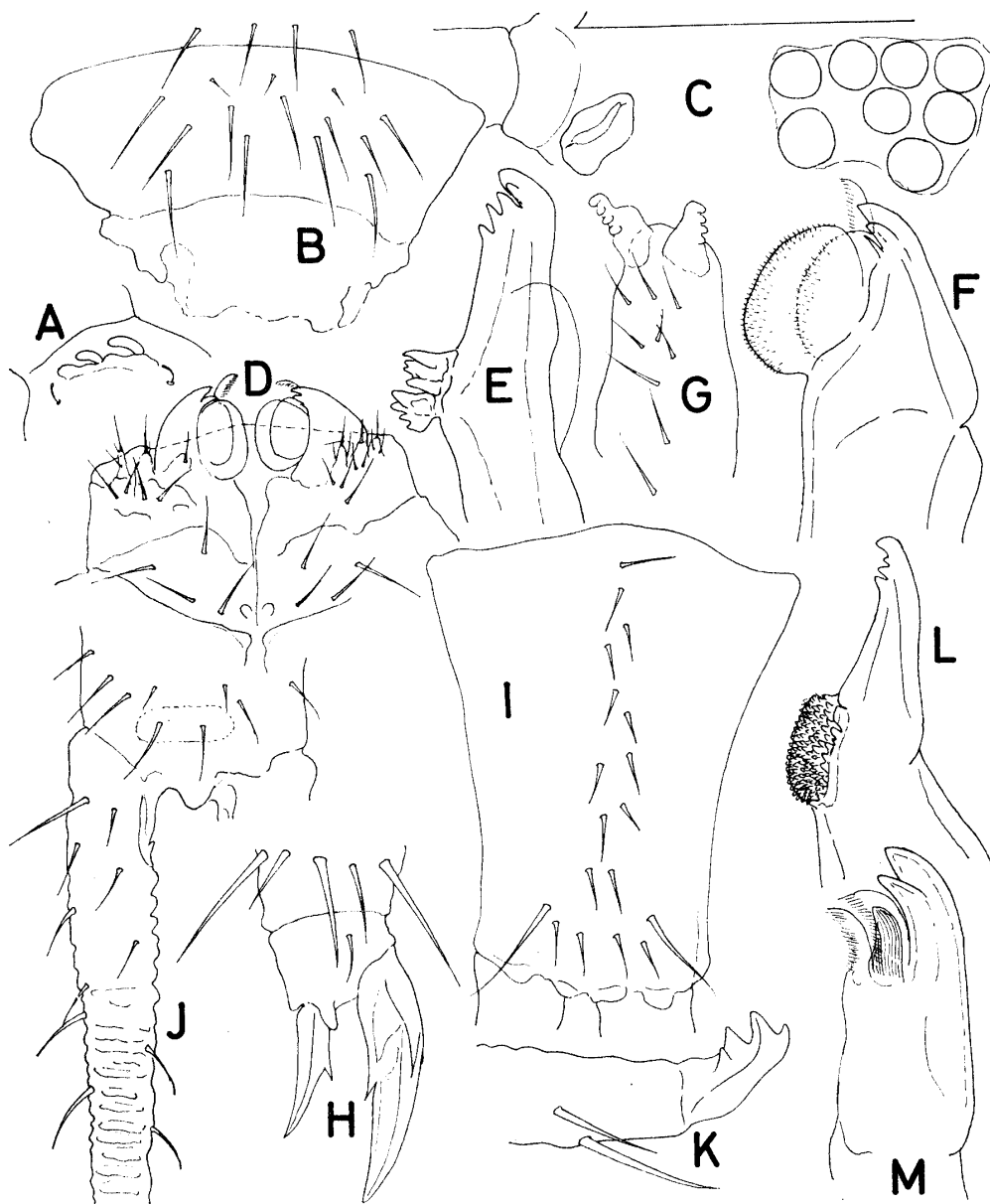


Fig. 9. *Cephalotoma ursi* sp. n. — A: ant. III-organ, B: labrum, C: eyes and postantennal organ, D: mouth in ventral view, E: mandible, F: maxilla, G: tenaculum, H: mid-leg, I: manubrium (ventral), J: manubrium and dens (dorsal), K: mucro. — *Cephalotoma mazda* (YOSII), paratypus, L: mandible, M: maxilla.

with the Palearctic *Isotoma grandiceps* (REUTER, 1891), with which *I. macnamarai* FOLSOM, 1918, may be a synonym. At present, *Cephalotoma* BAGNALL (1949) includes two other species: *Gnathisotoma bicolor* CASSAGNAU, 1957, from the Pyrenees and *Isotoma mazda* YOSII, 1971, from Himalaya, all of which are concordant in the position of the postantennal organ and the fewer number of manubrial ventral setae. As cited by CASSAGNAU (1957) this group has the regressive tendency of the mouth parts as in the case of *Archisotoma*. I

have investigated *I. mazda* (paratypus) once again. In this species, however, the mandible is in the normal form, but maxilla and labial papillae are somewhat degenerated (Fig. 9-M).

Distribution. Endemic to Hokkaido.

24. *Isotomiella minor* (SCHÄFFER, 1900)

Summit of Mt. Poroshiri (1 ex., 26. VII 1971); North Cirque, Mt. Poroshiri (2 exs., 25. VII. 1971).

Distribution. Cosmopolitan.

25. *Isotoma notabilis* (SCHÄFFER), f. *pallida* AGRELL, 1939

Summit of Mt. Poroshiri (1 ex., 27. VII. 1971).

Distribution. Cosmopolitan.

26. *Isotoma* (s. str.) *ohtanii* sp. n.

(Fig. 10)

Summit of Mt. Poroshiri (4 exs., 26. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (10 exs., 27. VII. 1971).

Body length 1.6 mm; ground colour dirty brown, dorsal side of the trunk lightly dark. Head with a distinct median patch, antennae bluish, other extremities paler than the body. Ratio of ant.: head is 9:7, ant. segm. ratio as 15:20:23:35. Ant. IV bearing an obscure swelling, a conical, not bifurcate seta and one small sensory rod with a spherical apex. Ant. III-organ is of two blunt rods without groove, without any accessory element. Labrum with setae 4/5, 5, 4; labral margin bearing 4 round, large tubercles. Eyes 6+6, intensely black. Postantennal organ subcircular, smaller than an adjacent eye. Unguis strongly carinate, with a pair of distinct lateral teeth and one obscure inner tooth. Unguiculus lanceolate, with one inner tooth. Tenent hair 2, 3, 3, clubbed at apex. Ventral tube anteriorly with ca. 5+5 setae. Posterior face with ca. 8 setae, the inner pair of the distal row larger than the others. Lateral flap bearing 7 setae each. Rami tenaculi quadridentate, corpus with 7 setae. Furca longer than antennae, man:d as 3:9. Manubrial ventral setae arranged in a triangle; distal ones converted to spinose setae. Terminal thickening has a single cusp. Dens converging, with transverse crenulations dorsally. Arrangement of dorsal setae as in Fig. 10-G. Mucro quadridentate, apical and anteapical teeth subequal, others smaller and standing close together. Abd. V and VI confluent, without any trace of coalescence. Body setae uncoloured, larger ones distinctly serrate unilaterally, while smaller setae are simple and smooth.

Typus: One example from Nanatsunuma Cirque, Mt. Tottabetsu.

The species is dedicated to Dr. Yoshio OHTANI of the National Science Museum, Tokyo, for the memory of our nice days in the mountain. It is near the description of *I. (Vertagopus) reuteri* SCHÖTT, 1898, a *species inquirenda* from arctic Siberia, but in the cited species

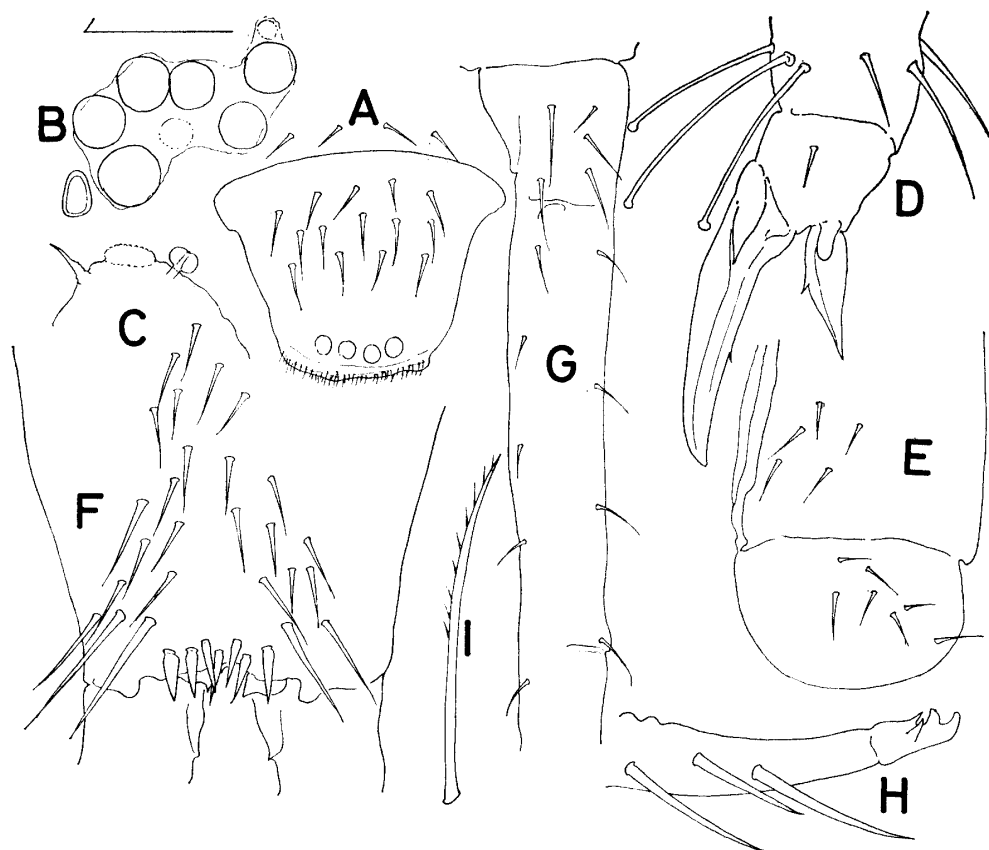


Fig. 10. *Isotoma* (s. str.) *ohtanii* sp. n. —A: labrum, B: eyes and postantennal organ, C: apex of ant. IV, D: mid-leg, E: ventral tube, F: manubrium (ventral), G: dens (dorsal), H: mucro.

the body colour is totally blue black. By the presence of the clubbed tenent hairs and fused abd. V and VI it must be placed in *Pseudisotoma* by the previous conception of the genus, but as it has distinct spiny setae on manubrial ventral side and as the labral margin has four rounded tubercles it must be regarded as a member of *Isotoma* (s. str.) by the author's new concept of the genus (YOSHII, 1963). In this connection I have reviewed *Ps. sensibilis* TULLBERG once again and found that it is utterly different from *Isotoma* (s. str.) in these respects. The genera *Pseudisotoma* and *Vertagopus* must be polyphyletic.

Distribution. Endemic to Hokkaido.

Family Tomoceridae

27. *Pogonognathellus borealis* YOSHII, 1967

North Cirque, Mt. Poroshiri (3 exs., 25. VII. 1971); Nanatsunuma Cirque, Mt. Totobetetsu (7 exs., 27. VII. 1971).

Distribution. Endemic to Hokkaido.

28. *Tomocerus (Tomocerina) aokii* sp. n.

(Fig. 11)

North Cirque, Mt. Poroshiri (20 exs., 25. VII. 1971); Nanatsunuma Cirque, Mt. Tottabetsu (16 exs., 26. VII. 1971); Mt. Muine, Hokkaido (3 exs., 15. VIII. 1964, M. KAWAKATSU).

Body length up to 2.4 mm; general colour pale yellow, antennae reddish gray throughout. In typical examples the head is deeply purplish on the frontal area and antennal basis is deeply black, but in pale forms the frontal area is lightly pigmented. Antennae rather short, being two-thirds the body or three times the head in length. Eyes black, with 6+6 eyes. Labral setae 4/5, 5, 4, with 4 recurving marginal spinules. Maxilla without prosthecal appendix. Unguis with more than 5, 5, 5 distinct inner teeth. Unguiculus

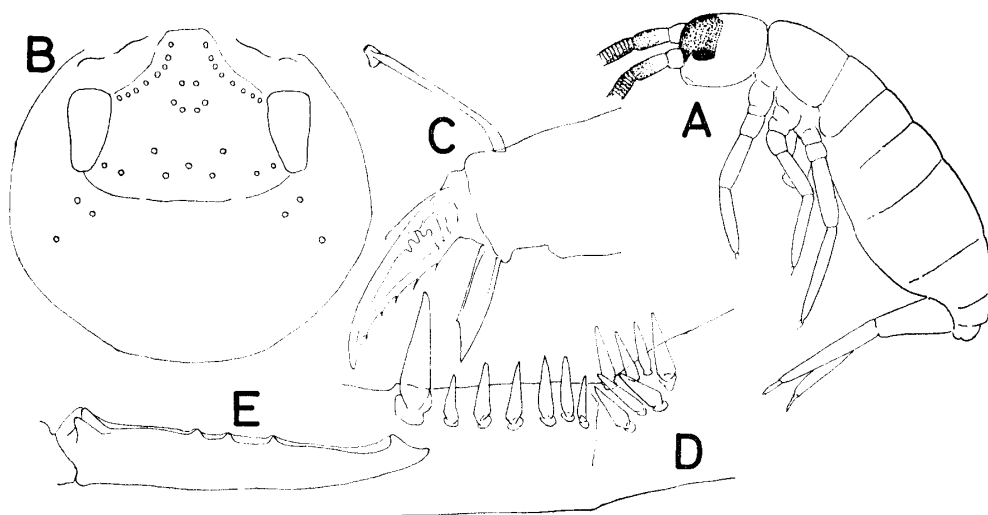


Fig. 11. *Tomocerus aokii* sp. n. — A: habitus, B: head capsule, C: hind-leg, D: dental spines, E: mucro.

broad, without inner tooth. Tenent hair short and slender, apically spatulate. Trochanteral organ represented by 1, 1 setae. Tibiotarsal spiny setae as 0, 0, 1. Rami tenaculi quadridentate, corpus with 5–6 setae. Furca in ratio 25:30:6. Dental spines simple, lightly brown and arranged as 6–8/5–6, I. Proximal spines in two rows. Mucro with two dorsal lamellae, the outer lamella bearing 2–4 (usually 3) intermittent teeth. Outer tooth of a pair of basal teeth without toothlet. No setulae around s.s. and large body setae. Chaetal arrangement of head as in Fig. 11–B; this pattern is concordant in all examples examined and quite different from that of *T. varius* FOLSOM (YOSHII, 1967, fig. 7, A).

Typus: One example from North Cirque of Mt. Poroshiri.

The species is dedicated to Dr. Jun-ichi AOKI of the National Science Museum, Tokyo. It is distinguished from other *Tomocerina* spp. by the large number of dental spines. They are arranged in two rows on proximal part of dens.

Distribution. Endemic to Hokkaido.

Family Sminthuridae

29. *Deuterosminthurus ezoensis* sp. n.

(Fig. 12)

North Cirque of Mt. Poroshiri (3♂, 2♀, 25. VII. 1971).

Female. Body length ca. 0.75 mm; almost pale and faintly brownish all over. Ratio of ant.: head 5:3, ant. segm. ratio as 10:18:28:50. Ant. IV subdivided into eight subsegments. Eyes black, postocular tubercles distinct, but no frontal and facial setae are modified. Labral setae as 6/3, 5, 4, setae of the first row being small. Labral margin with 4 tubercles, the inner pair very small, the outer pair longitudinal and with 2 cusps each. Unguis of all legs distinctly acuminate and with one small inner tooth near the basis. Unguiculus also converging, without axial seta, but on hind-legs there is a narrow inner lamella. Distal part of tibiotarsus bearing 3, 3, 2 curving tenent hairs, whose distal end is broad and suddenly truncate. Setae along the posterior face of each legs weakly spiny. Rami tenaculi tridentate, corpus with 3 setae at apex. Furca well developed, man.: d.: mu. as 20:45:15.

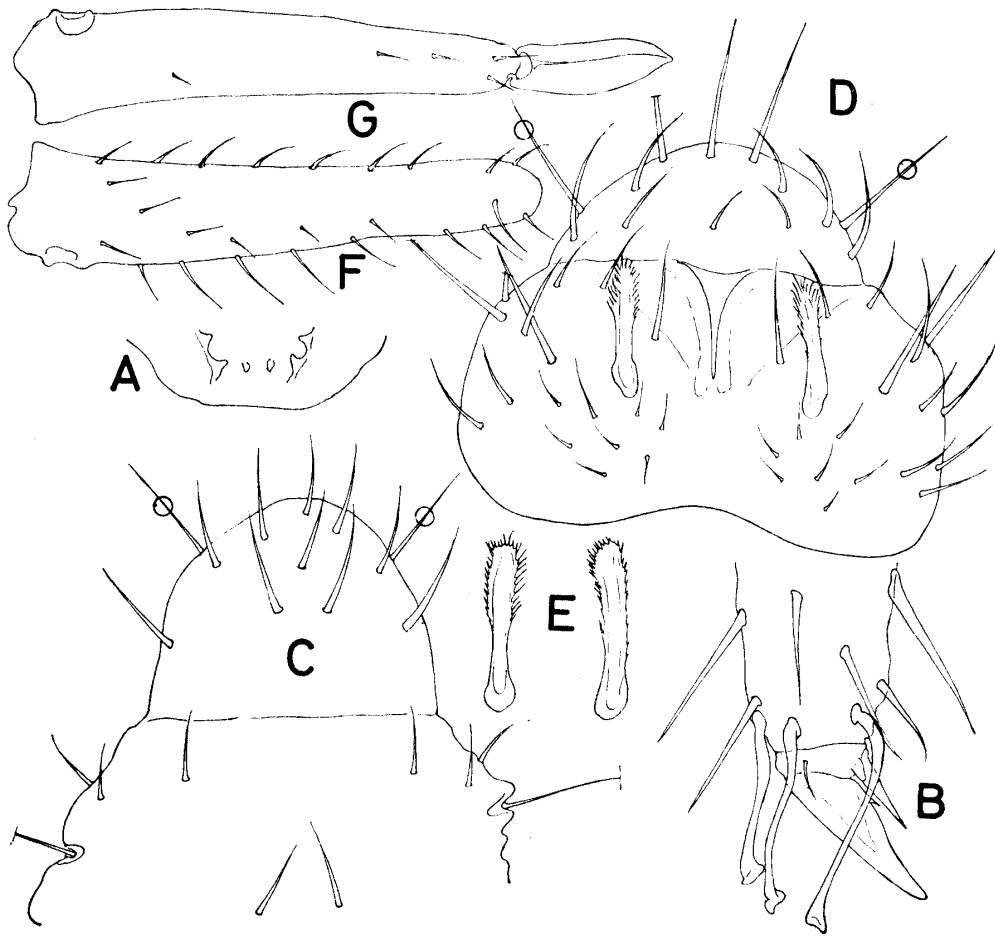


Fig. 12. *Deuterosminthurus ezoensis* sp. n. (female). — A: labral margin, B: mid-leg, C, D: anogenital segment in dorsal and ventral view, E: appendix analis, F: dens (dorsal), G: dens and mucro (ventral).

Manubrium with 8+8 small dorsal setae. Dental setae as in Fig. 12-G and 12-F with 8 outer, 9 inner, 8 dorsal and 5 (2, 1, 1...1) ventral setae. Mucro boat-shaped, carinate ventrally and with broad, smooth margins. An obscure mucronal pseudonychium present. Anogenital segment posteriorly produced, setal arrangement being quite symmetrical as shown in Fig. 12-C; some of them are erect and others are curving, but none of them are modified. Appendix analis elongate, its distal half is lamellose, finely fringed on each side.

Male. Length ca. 0.6 mm. No setae of the head are modified. Corpus tenaculi with 2 setae. Dental setae of the dorsal side are less in number. Anogenital segment is less produced and no seta is modified.

Typus: One female from the North Cirque of Mt. Poroshiri.

The species is a near relative of European *D. flava* GISIN, 1946, differing from it in the form of appendix analis. It differs from Holarctic *D. repandus* (AGREN, 1903) by the smaller number of setae on ventral side of dens (cf. GISIN, 1946; PALISSA, 1964, p. 262).

Distribution. Endemic to Hokkaido.

30. *Heterosminthurus pirika* sp. n.

(Fig. 13)

North Cirque of Mt. Poroshiri (1♂, 25. VII. 1971).

Male. Body length 0.8 mm. Body with castaneous brown patches. Head bearing a

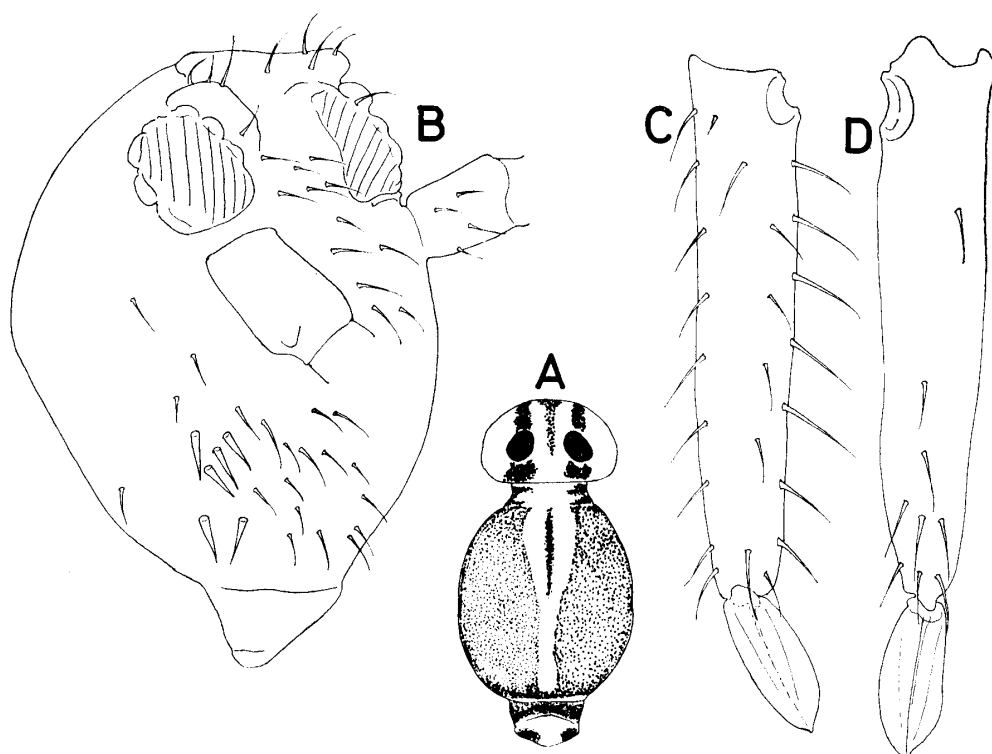


Fig. 13. *Heterosminthurus pirika* sp. n. (male).—A: habitus, B: head, C, D: dens and mucro (dorsal and ventral views).

pair of longitudinal stripes across the black eye-field and a median patch of lighter coloration. Trunk with a narrow median stripe on the anterior half of it, with the sides distinctly pale up to the anogenital margin. Lateral part of the trunk uniformly deep brown. Genital segment deeply pigmented, while the anal segment is pale and with a small paired patch on each side. Antennae lightly pigmented, other extremities pale; ant.: head as 85:90, ant. segm. ratio as 15:25:55:90. The last segment is divided into eight subsegments, the proximal one of which is very long. Frontal setae of head not modified, but in the facial area 6+6 lateral setae are remarkably thick and spinose, while the median ones are quite normal. Legs and claw usual for the genus. Truncate tenent hairs 3, 3, 2, terminally situated. Unguis untoothed. Unguiculus slender in fore-legs, shorter and with inner lobe in the others. Rami tenaculi tridentate, corpus with 2 apical setae. Furca with d.: mu. as 50:15. Manubrium with 9+9 small dorsal setae. Dental chaetotaxy consisting of 9 outer, 8 inner, 8 dorsal and 9 (3, 3, 1, 1...1) ventral setae. The length of inner setae ca. two-thirds of the mucro in length. Mucro boat-shaped, ventrally keeled and with smooth margins. A faint pseudonychium present. Anogenital segment saddle-like; no seta on it is modified.

Female unknown.

Typus: One male from the North Cirque of Mt. Poroshiri.

In the coloration of the body *H. pirika* is identical with *H. novemlineatus* (TULLBERG, 1871) f. *unilineatus* STACH, 1956, of Poland, from which it is easily distinguished by the modified lateral group of the facial setae on the head. They are very unique and not to be compared with any other known form of the genus. "Pirika" means "beautiful" in Ainu language.

31. *Sminthurus viridis* (LINNÉ, 1758)

North Cirque, Mt. Poroshiri (4 ♀, 25. VII. 1971); Nanatsunuma Cirque, Mt. Totobetetsu (1 ♀, 27. VII. 1971).

Distribution. Cosmopolitan.

32. *Ptenothrix janthina* BÖRNER, 1909 (*sensu* YOSHII et LEE, 1963)

Summit of Mt. Poroshiri (2 ♀, 26. VII. 1971).

Distribution. Endemic to Japan.

要 約

北海道の高山帯のトビムシ相は、世界的な分布の問題からみて、はなはだ興味がある。このたび報告したポロシリ岳からの32種はもちろんその一部分にすぎないだろうが、その資料からおしはかかって、ほぼ全体を知ることができよう。

ポロシリ岳の北カールには、調査隊がキャンプした7月下旬にもまだ残雪があり、万年雪が広い面積を占めていた。日中の気温はすでにかなり高いので、この雪田からは多量の融水が流れ出して、それがカールの底に湿地帯をつくっていた。この湿地帯の周辺では多数のシロトビムシが得られたが、それらは *Onychiurus tomuraushensis* (YOSHII) であった。この種は1940年に、当時、第三高等学校山岳部の部員であった梅棹忠夫、

川喜田二郎の両君によってトムラウシ岳（大雪山）の頂上付近の湿地帯からもたらされ、著者の記載したものである。今回の豊富な資料によって、さらに研究してみると、これは北米に産する *Onychiurus subtenuis* FOLSOM に近似しており、肢の小爪の形において差のある別種であることがわかった。

BAGNALL (1949) は、著者の原記載にもとづいて、本種を模式種として *Protaphorurodes* という新属をつくったが、これは彼の立てた他の各種の属とおなじく、一般には認められていない。しかし、これを亜属として *Onychiurus* という大きな属の細分につかうことは、たいへんおもしろいし、また、このような考え方によってシロトビムシ属を再検討することがぜひ必要である。そのような意味からも、今回の資料は著者にとって、まことに貴重なものであった。棲息地が上述のような高山帯の湿地にかぎられていることからみて、この種は日本のトビムシのなかでも、いちばん cold stenothermal な性質を持っているものと考えられる。

報文に記したように、ポロシリ岳の高山帯のトビムシのなかには、シベリアのツンドラ帯や、カナダの極北地方に分布するものがはなはだ多い。また、別種ではあっても、上述のシロトビムシのごとく、その近似種が極北の地域に分布している場合がすくなくない。とくに興味のあるのは *Cephalotoma ursi* sp. n. で、その近似種の *C. grandiceps* (REUTER) はシベリアから、*C. macnamarai* (FOLSOM) は北米（ロッキー）から知られている。従来、これらの種は *Isotoma* 属に含まれていたのであるが、今回の *C. ursi* によって口器を解剖してみたところ、あきらかに *Isotoma* とは異なっていて、別属とすべきものであることが判明した。さらに文献により、この *C. ursi* と同属にすべきものが、ピレネー山脈の高山帯から1種 (*Gnath-isotoma bicolor* CASSAGNAU), ヒマラヤの氷河付近から1種 (*Isotoma mazda* YOSHII) 報告されていることがわかり、後者の口器を再検討し、記載した。

この報告のなかには、アヤトビムシ科 Entomobryidae に属するものがひとつもない。これは著者が省略したのではなくて、じっさいに1頭も採集されなかったためである。一般にアヤトビムシ科は、寒地においては、個体数も、種類数も減少するのが普通であるが、今回の場合のように極端な結果が出たのはめずらしい。おなじ日高であっても、山麓の振内付近の資料には多数のアヤトビムシが見られる。

日高山脈の高山帯のトビムシを、北海道の他の山系のそれと比較することは、現在のわれわれの知識をもってしては不可能である。他の昆虫群とことなり、今回の報告が北海道の高山帯のトビムシ相に関する唯一の総括的なものだからである。ただ、トビムシの分布についての一般常識からすれば、日高山脈と、夕張山脈と、大雪山系とのあいだに、大きな差はないだろうという予測はできる。しかし、これを日本アルプスの高山帯と比較すれば、かなり異なったトビムシ相であることは断言できる。黒部五郎岳や、仙丈岳のカールの残雪付近では、*O. tomuraushensis* でない別種のシロトビムシ（未記載）が、おなじような生態条件のところに見出されるからである。

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